PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

PLANTERS' BULLETIN FIFTY-THREE

CONTENTS

	Page
Editorial: Malayan Rubber Production 1960 – 1970	43
Planting Recommendations 1961 – 62	47
Planting Materials Used in Malaya 1959	54
RRIM 600 Series Clones	58
Correction of Manganese Deficiency	63
Notes, Book Review, R.R.I. News	66 – 70

Price
50 Cents

March
1961

COMMONWEALTH MYCOLOGICAL INSTITUTE
5 APR 1961

RRI

LOCATION. The Institute's laboratories and offices at the third mile, Ampang Road, Kuala Lumpur are open from 8 am to 1 pm and 2 pm to 4 pm on Mondays to Fridays, and from 8 am to 12.30 pm on Saturdays.

EXPERIMENT STATION AND FACTORY. This station of the RRI is situated 16 miles from Kuala Lumpur, at Sungei Buloh on the Kuala Lumpur — Kepong — Kuala Selangor road. Visits may be made on Mondays or Wednesdays by arrangement. There is a guest house.

CORRESPONDENCE. All LETTERS must be addressed to the Director, Rubber Research Institute of Malaya, Post Office Box 150, Kuala Lumpur. Special enquiries may be marked for the attention of particular officers. The address for TELEGRAMS is Searching, Kuala Lumpur. TELEPHONE: Kuala Lumpur 72051. PARCELS occasionally arrive without any indication of their origin. Senders' names and addresses should be written clearly on the outside of all packages, and advice of despatch should be given by letter or telegram.

PROHIBITED PLANT SPECIMENS. Attention of planters and others in territories outside the Federation of Malaya and Singapore is drawn to the Malayan Plant Importation Rules which prohibit the importation into Malaya of any part of a plant, whether living or dead, unless it is accompanied by a permit issued by the Director of Agriculture, Federation of Malaya. No permit will be issued in respect of any diseased plant or any plant pest. Any plant imported in contravention of these Rules (whose object is to prevent the introduction of diseases or pests) will be destroyed without examination. Anyone outside Malaya who desires our advice on any matter that may require examination of living material must first enquire by letter.

ADVICE. Enquiries are invited from rubber producers in the Federation of Malaya, Singapore, Nigeria, the colony of North Borneo, and the territories of Sarawak and Brunei, who may require more detailed information applicable to their own special problems. Where it is considered necessary, visits will be made to estates in Malaya as convenient. Visits to estates in other territories are by special arrangement. The only visits for which charges are normally made are those of our clone indentification inspectors. INTERVIEWS should be arranged by letter, as members of the senior research and advisory staff are frequently absent on visits to plantations.

PUBLICATIONS. Subscription to all or any of our series of publications (*Planters' Bulletin, Journal, Reports,* and miscellaneous booklets) may be made by depositing $15 with us. An annual statement of account will then be submitted. We are unable to give annual subscription rates or any form of discount, but for multiple subscriptions a lower rate of initial deposit is acceptable. Postage is charged on oversea mailings. A list of 'Publications of the RRI' is available on request.

PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

Kuala Lumpur March 1961 Number 53

Editorial: Malayan Rubber Production 1960—1970

Several forecasts of future Malayan rubber production have appeared in the press in recent months, the predictions for 1970 varying from 950,000 to 1,200,000 tons. Such forecasts are of interest from two points of view. First, if we assume, as most economists do, an expanding world market for rubber in the next ten years, it is important that natural rubber should meet as big a proportion of the total demand as possible. Second, an accurate forecast can tell us what proportion of future Malayan output will come from improved, and therefore more profitable, planting material.

We have now estimated Malayan production for the next ten years. It will be seen that our estimate for 1970, approximately 1,050,000 tons, roughly confirms the forecasts already made, but leans to the side of the more modest previous estimates. We give below a brief account of the methods* used and explain what assumptions we have made.

OUTPUT FROM ESTATES

Our forecast for each year is calculated by dividing the total estimated planted acreage into:

1. Unselected old seedlings
2. Pre-war material classified as high yielding
3. Post-war material in tapping
4. Immature rubber

The figure for the acreage of each group is multiplied by the corresponding yield per acre and the sum of the products is the forecasted yield.

Acreage Trends

It is estimated that replanting on estates will decrease from 75,000 acres per year in 1960 to 40,000 acres in 1970. New planting is likely to be 15,000 acres per year. It is assumed that the present high level of loss of estate acreage by fragmentation will fall to a level of 15,000 acres per year in the future; as these 'lost' areas are merely transferred

* The details of the methods used and the estimates made are published as *Research Archives of the Rubber Research Institute of Malaya, Document 13, 'A Forecast of Malayan Rubber Production 1960 — 1970'.*

from estates to smallholders, an error in this figure cannot materially influence the accuracy of the estimate for total production. *Figure 1* demonstrates the very important trends in acreages under various types of planting material on estates. In 1970 high yielding material should occupy 87% of the total planted area.

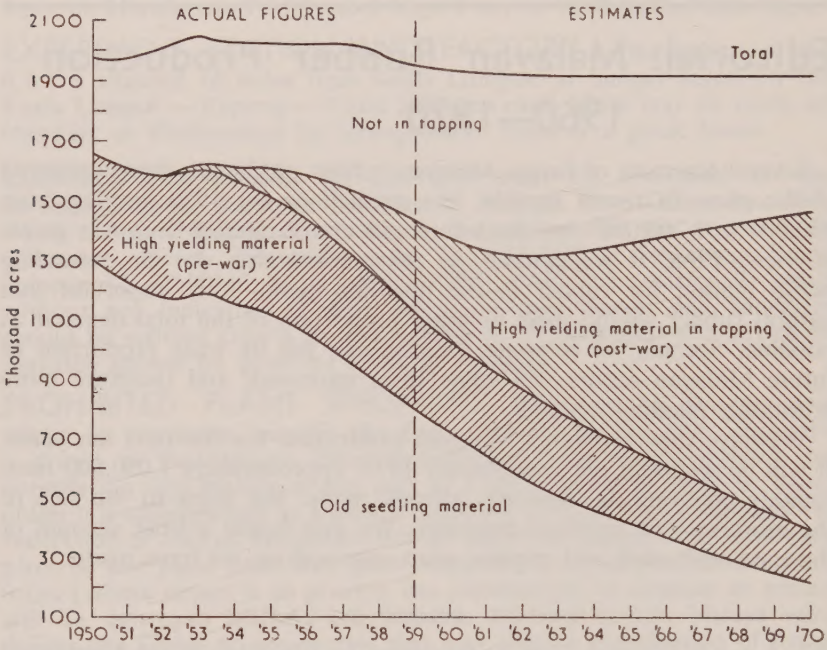

Figure 1. Acreage on estates under various types of planting material, 1950 — 1970.

Yield Trends

The assumptions regarding the yield per acre for the various groups of planting material are:

(1) The yield per acre for the old unselected seedlings, which increased from 350 lb to 430 lb over the period 1954 – 1959, will be 480 lb in 1962 and thereafter slowly decrease, owing to the increased age of this material, to 400 lb in 1970.

(2) The yield per acre for pre-war high yielding material is estimated to be 960 lb in 1959. We have assumed that owing to the greater use of yield stimulation and intensive tapping systems this will increase (at the very minimum) to 1000 lb, and thereafter decrease slowly to 800 lb in 1970 because of the increased age of these pre-war plantings.

(3) Post-war planting material consists broadly of two groups and the areas under each group can be roughly estimated. On one hand we have older clonal seedlings and older clones, like Tjir 1 and

PB 86; on the other hand modern material, such as clones RRIM 501, PB 5/63, and the RRIM 600 series clones. Basing our calculations on commercial yield records (which are provided by a number of estates), experimental records and general experience, we have assumed an average yield curve for each of these two groups.

For the older clones and clonal seedlings, yield is estimated to increase from 450 lb per acre in the first year of tapping to 1200 lb per acre in the seventh year; from the tenth year onwards, when renewed bark is tapped, a slow decrease down to a 1000 lb per acre level is assumed.

For modern material, yield is estimated to increase from 500 lb per acre in the first year to 1500 lb per acre in the seventh year of tapping. It is appreciated that various clones are capable of yielding 2000 lb per acre and more; the average figures, however, represent all plantings, including those whose yields are for one reason or another below optimum.

From the assumptions outlined above, we deduce that the annual rate of increase of the estate production will vary from 2 to 4% for the next five years; after 1965, production will rise more steeply. The estimated production for 1970 is 614,000 tons, or a 50% increase compared with 1959.

OUTPUT FROM SMALLHOLDINGS

The estimates of smallholders' production have been made on similar lines; however, since no accurate statistics of acreage and yield for smallholders are available, any prediction is of limited value.

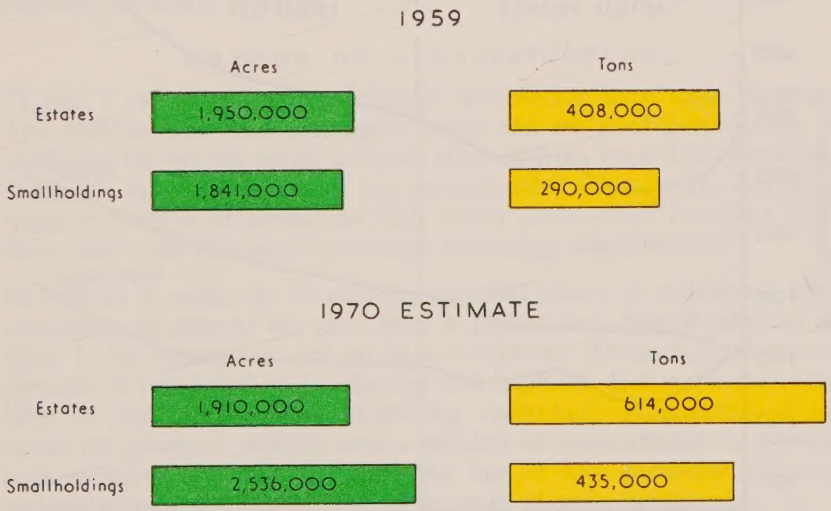

Figure 2. Acreage and output of estates and smallholdings 1959 and 1970.

Acreage Trends

It is estimated that total smallholders' acreage was 1,840,000 acres in 1959, and that new planting, replanting and fragmentation will give a total smallholders' acreage of 2½ million acres in 1970. (See *Figure 2*). This is the result of various development plans now in operation. The percentage of high yielding material is at present much lower on smallholdings than on estates; in 1970 it should reach a figure of about 70% compared with 87% on estates.

Yield Trends

An average yield of 450 lb per acre on pre-war plantings is assumed up to 1963, after which a slow decrease with age down to 380 lb in 1970 seems probable. For post-war high yielding material, estimated yields per acre are 80% of the corresponding estate figures.

Total smallholders' output is expected to remain at a level of 300,000 tons for the next five years; thereafter a rather sharp increase is expected up to an estimated 435,000 tons in 1970. *Figure 2* compares estates' and smallholders' acreages and production in 1959 and 1970.

TOTAL OUTPUT

Combining the estimates for estates and smallholdings, total output will rise, as shown in *Figure 3*, from 698,000 tons in 1959 to 1,049,000 tons in 1970. Such a precise figure does not allow for the errors which are

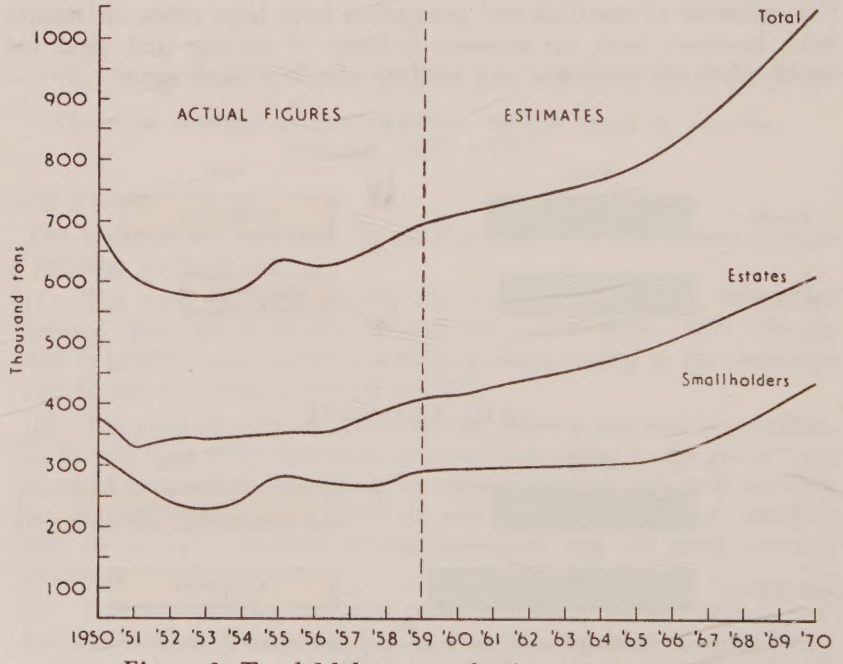

Figure 3. Total Malayan production; 1950 — 1970.

bound to occur in any prediction. A 'safe' estimate for 1970, allowing for such errors, but still based on the assumption that there will be no revolutionary changes either in replanting policy or management practice, would be in the range 1,000,000 to 1,100,000 tons.

It is clear that Malaya should be in a position to produce more rubber at lower cost in the next ten years, thanks to replanting with improved material (which will have its most marked effect after 1965) and to the continued use of improved techniques which have already been introduced.

Our estimate is, of course, a conservative one. We have not assumed that there will be any striking increase in the efficiency of the industry, nor that existing practices aimed at the more effective exploitation of the tree (for example, intensive tapping and yield stimulation) will be rapidly extended. Given a more energetic adoption of improved practices throughout the industry in the next decade, our Editorial in ten years time may well be entitled 'Underestimate in 1961'.

Planting Recommendations 1961-62

OUR PLANTING RECOMMENDATIONS FOR 1959-60 were published in *Planters' Bulletin 40;* a few amendments were given in *Planters' Bulletin 46.*

The present article brings these recommendations up to date. We have introduced a few further changes in the method of classification of planting material which we think will conform more with the demands of estate practice.

METHOD OF CLASSIFICATION

CLASS I refers to planting material suitable for large scale planting. This material has been thoroughly tested and the good performance is confirmed by records which we have received from large scale plantings. However, most of the clones are recommended with certain qualifications, as there is at present no fully tested clone which combines first-class yield with all-round favourable secondary characteristics.

CLASS II is made up of planting material which is considered very promising. In general the yield level is higher than that of material of Class I, but testing has not yet been completed. There is therefore an element of risk involved in planting this material. Not more than one third of the total planting (including replanting) programme of an estate (or group of estates) over a number of years should be planted with material of Class II, while the use of any particular planting material should not exceed 10% of the total planting programme.

Example: suppose that an estate has planned a four-year replanting programme of 600 acres in total, then 200 acres (one third of the total

replant) may be allotted to material of Class II, but not more than 60 acres (10% of total replant) to a particular clone or seedling selection. In order to avoid small monoclone or seedling blocks, the Class II material may be planted in excess of the annual average during any particular year, but not of course during the whole period of the re-planting programme.

CLASS III contains clones recommended for planting on an experimental scale. We have made a further sub-division into:

CLASS IIIA: planting up to 25 acres per clone. The clones in this group are promising, but there is not sufficient information available to warrant planting on a moderate scale (Class II). This group also contains clones which are of very high yield capacity but have shown undesirable characteristics in some trials. When more information becomes available they will either be promoted to Class II or be discarded from the recommendations.

CLASS IIIB: in this class a number of new selections have been grouped together with foreign exchange clones. Our information on these clones is usually limited to a small number of trees. We recommend that small blocks of one task size be planted with this material so that a source of budwood will be available for further multiplication if some of these clones prove to be 'winners'. One may also in this way obtain some first hand evidence of the suitability of the clone for local use in advance of a possible firm recommendation to plant it on a larger scale.

CHANGES FROM PREVIOUS RECOMMENDATIONS

The changes from our 1959-60 Planting Recommendations are:

CLASS I (large scale planting)

Clone RRIM 501 has been withdrawn because of the high incidence of trunk snap sustained in areas where the clone has been opened for tapping according to current standard criteria. This breakage usually takes place after some three to four years of tapping, a subject which has been discussed in more detail in *Planters' Bulletin 43*. Experiments are in progress to find a practical method of saving areas where this clone is already in a wind-susceptible condition. Those estates which have immature areas are advised to postpone tapping until the trees have reached a girth of 25 inches. The effect of postponement of tapping on yield and wind damage is also being investigated in large scale experiments. This very high yielding clone will be re-introduced into the planting recommendations if methods of planting and husbandry are found which prevent the trunk snap experienced at present on so severe a scale.

Clonal seedlings: Prang Besar Isolated Garden seed from plot D and Further Proof A and B are no longer available for sale; neither is Chemara Isolation Garden seed 'B'.

CLASS II (moderate scale planting)

Clone RRIM 605 has been promoted to Class II on the strength of the performance in large scale clone trials.

Clone LCB 1320 has been discarded because of liability to wind damage reported in Java and Sumatra where the clone is no longer recommended. The clone is of very good vigour but the yield is probably not up to the standard of the other clones in Class II.

Clone Ch 26 has, after consultation with the Chemara Research Station, been downgraded from Class II to Class III because of risk of wind damage.

Seed of four new seed gardens planted with proven and with promising seed parents is introduced; these are Prang Besar Gough Gardens I and II and seed gardens at Kajang Estate and Kuala Perak Estate.

CLASS III (experimental scale planting)

Clone RRIM 609 has been included, as it shows very good vigour on tapping and a constantly improving yield level.

Clones PB T/157 and T/495 have been deleted after consultation with Messrs Prang Besar Estate.

Of the 'foreign exchange clones', WR 101, Nab 15, IRCI 7 and AVROS 1734 appear the most promising in the light of information from abroad and of their performance up to the third year of life in the R.R.I.M. foreign exchange clone trials. They have been maintained in Class III(A) (recommended for planting up to 25 acres). Other foreign exchange clones are grouped in Class IIIB (recommended for planting of one task). In the latter group new RRIM, Prang Besar and Chemara selections have also been introduced.

RECOMMENDED MATERIAL

The material recommended for planting is given below:

CLASS I — For planting on a large scale.

Clones: Gl 1, PB 86, PR 107, RRIM 513, Tjir 1.

Clonal seedlings: Prang Besar Isolated Garden seed from plots F and G; Chemara Isolation Garden seed 'E'; Tjir 1 mother seed from registered collection areas and seeds from registered polyclone areas planted with proven seed parents.

CLASS II — For planting on a moderate scale, up to one third of total planting programmes in aggregate.

Clones: GT 1, PB 5/51, PB 5/63, RRIM 519, RRIM 526 and RRIM 605.

Clonal seedlings: seed of Prang Besar Gough Garden I and II; seed gardens at Kajang Estate and Kuala Perak Estate; registered monoclone areas of clones recommended for large and moderate scale planting but

not fully proven as seed parents; seed collected from boundaries between plantings of good seed parents such as clones Tjir 1, AVROS 157, BR 2, Pil B84, RRIM 501, PR 107, GT 1 and LCB 1320.

CLASS IIIA — For planting on an experimental scale up to 25 acres per clone.

Clones: RRIM 600, 607, 609, 623, 628; Ch 26, 30, 32; PB 5/76, 28/59, 28/83; AVROS 1734; IRCI 7; Nab 15; WR 101.

CLASS IIIB — For planting in small observation plots (one task).

Clones: RRIM 632 and 638; RRIM 701 and 707; Ch 148 and 153; PB 206, 213, 217; AVROS 427, 1191, 1447, 2037; IRCI 6; Nab 12 and 20; PR 228, 251, 252; RRIC 5, 7, 14, 45.

Seed for Stocks

We recommend that clonal seed be used, preferably of vigorous and good yielding clones, and that generous selection is made on vigour of the seedlings, either by planting four seeds per point in the field and budding only the most vigorous of these or, if budding is done in the nursery, by using only the vigorous seedlings.

BRIEF NOTES ON THE RECOMMENDED CLONES

For Large Scale Planting

Gl 1 — A moderately vigorous clone with a balanced, wind-resistant crown and dark green foliage. It does well on most coastal soils and on the better inland soils. It is extremely susceptible to brown bast, and should be tapped at a 67% intensity tapping system. The latex is very unstable and therefore unsuitable for concentration. Pre-coagulation and processing difficulties often occur with RSS and crepe manufacture. Extension of planting is only justified on estates where the clone has been particularly successful.

PB 86 — A clone of moderate vigour, with particularly slow growth on poor soils in the early years. The clone is susceptible to *Gloeosporium* and should be planted only under conditions where satisfactory growth has been experienced in the past; under those conditions PB 86 is still a good all-round clone. It is not prone to wind damage; bark characters are average to good; the clone is not susceptible to brown bast. Recent results indicate that many plantings of this clone give a concentrate of low stability, containing excessive magnesium. The latex is suitable for pale crepe manufacture.

Messrs Prang Besar recommend planting this clone at a lower density than normal.

PR 107 — A vigorous clone with very good habit; the clone has a rather heavy but well balanced crown, and is particularly resistant to wind damage. The early yields are lower than those of RRIM 501 and 513. Its average production over several years approximates to that of PB 86. The latex is white but usually of low or marginal stability.

RRIM 513 — The clone is in the same high yielding class as RRIM 501, but is sometimes less vigorous. It has a rather heavy crown and trees may lean on poorly drained soils. No serious wind damage has been experienced. Virgin and renewed bark thickness are a little below average.

This is one of the clones which could profitably be planted at reduced stand per acre (*Planters' Bulletin 34*, p. 5). The latex is suitable for all manufacturing processes.

Tjir 1 — Generally a less satisfactory clone than PB 86, although of better vigour. It yields well during the wet season, but shows a severe yield depression during and after wintering. The clone is rather susceptible to wind damage and locally to brown bast. The bark characteristics are good, the latex is usually stable, but may give trouble during wintering. The colour of the latex is usually yellow.

For Moderate Scale Planting

GT 1 — A clone of average vigour, with straight stem and compact crown of dark green leaves. The clone is late branching, and in certain cases methods of inducing branching may be desirable. It is one of the highest yielding clones in Indonesia, where it is planted on a large scale. No yield records are yet available from our experiments. The clone appears resistant to wind damage. Bark thickness is average. From limited tests the latex appears suitable for manufacture of pale crepe and for concentration.

PB 5/51 — An attractive clone of average vigour and good branching habit. If planted too close, or if thinning is delayed, side branches are apt to fall off, leaving a rather high crown. From records available, this clone is a very high yielder, though possibly inferior to PB 5/63 in this respect. It appears to be resistant to wind damage. The latex is suitable for concentration, and gives a yellow crepe.

PB 5/63 — A vigorous clone, with a heavy crown, Branching is sometimes forked. Messrs Prang Besar recommend pruning of the heavy side branch. The clone is perhaps best planted in less exposed situations. The bark has slightly protuberant buds leading to bleeding in the upper branches. The clone has given very high yields in trials and in commercial areas. It has been shown to be somewhat susceptible to *Gloeosporium*. The latex is yellow and suitable for concentration.

RRIM 519 — A vigorous clone with a straight stem, good virgin bark and bark renewal. Its yield in various clone trials established in the pre-war period was good, especially during the later years of tapping. The clone is of average brown bast susceptibility, resistant to wind damage, but may lean or fall on soils with a high water table. Girth increment of tapped trees is high. The latex is of marginal stability and gives slightly yellow crepe.

RRIM 526 — A fairly vigorous, high yielding clone with an attractive habit. It is not prone to wind damage; virgin and renewed bark thicknesses are good. The clone appears not to be sensitive to pink disease

but has proved highly susceptible to *Gloeosporium* in certain localities. The latex is slightly yellow but is suitable for the manufacture of pale crepe.

RRIM 605 — Probably the best of the RRIM 600 series clones, in the same yield class as RRIM 501. Growth is average, girth increment of tapped trees is satisfactory. Bark thickness and bark renewal are good. The clone has a straight stem, a rather low and wide, balanced crown, with dense foliage. No wind damage has been experienced so far. The latex has a high d.r.c. and is of marginal stability. The crepe is yellow.

For Experimental Scale Planting

RRIM 600 — Above average in vigour, with a good girth increment when tapped. The clone has a steadily increasing, high yield level; it is the highest yielding clone in the trial at the R.R.I. Experiment Station in the fifth year of tapping. Some branch breakage has been experienced because of weak junction of the main branches with the trunk; the tapping panel bulges in some trees. The stability of the latex is low. The crepe is white.

RRIM 607 — A clone with attractive habit and probably the least liable to wind damage of the 600 series clones. Yield is below the RRIM 501 level, but better than that of PB 86 or PR 107.

RRIM 609 — Below average in vigour in the immature stage, but with high girth increment of tapped trees. The clone seems resistant both to pink disease and wind damage but it has a pronounced tendency to suffer from wounding. Yield is in same class as RRIM 607. The stability of latex is good. The crepe is pale yellow.

RRIM 623 — One of the most vigorous clones of the RRIM 600 series, with a straight stem, heavy and upright branching, and a rather narrow crown with dense foliage. Virgin and renewed bark are below average in thickness; renewal however, is better than that of RRIM 501. No wind damage has been experienced so far, but the branching system may be weak. Yield in the large scale trial at R.R.I. Experiment Station was similar to that of clone RRIM 501 up to the fourth year of tapping. In some estate trials however, it yielded less than clone RRIM 501. The latex has a high d.r.c. and is of good stability; the colour of the crepe is light yellow.

RRIM 628 — Highest yielder of the RRIM 600 series clones. The clone is not vigorous; the girth increment of tapped trees is poor. The continuous high yields may lead to brown bast, and a 67% intensity tapping system is probably indicated. The latex is stable; the colour of the crepe is light yellow.

Ch 26 — Vigorous and high yielding. The clone has suffered severely from wind damage on various sites. The stability of the latex is low; the crepe is white.

Ch 30 — A vigorous, slow starting clone; in later years high yielding; no wind damage has been reported. The stability of the latex is rather

low; the crepe is white.

Ch 32 — Vigorous and high yielding; no wind damage has been reported. Bark renewal is particularly good; the latex is not suitable for concentration and crepe production.

PB 5/76 — Vigorous with attractive, wind-resistant habit, yielding well in a Prang Besar Further Proof trial. The stability is low, and the crepe is deep yellow.

PB 28/59 — Of average vigour; yielding very high in various Prang Besar trials. The clone is susceptible to brown bast, the crepe is light yellow.

PB 28/83 — A vigorous clone with dense canopy; high yielding in Prang Besar trials. The latex is unsuitable for concentration, the crepe is light yellow.

AVROS 1734 — Vigorous and high yielding in various trials in Sumatra. The stem often tends to bend; the crown is heavy. The clone is susceptible to pink disease.

IRCI 7 — Recommended in Vietnam as vigorous and high yielding.

Nab 15 — A vigorous clone, recommended for small scale planting in Ceylon.

WR 101 — Recommended for large scale planting in Java. Very high yielding, but less vigorous than GT 1. The clone carries a small crown. Budding success is often poor. The latex is white but rather unstable.

SOURCES OF PLANTING MATERIAL

Seed. No seed is supplied by the R.R.I. Experiment Station to estates; the seed from the RRIM gardens is reserved exclusively for smallholders, to whom it is distributed through official channels. A list of budded areas approved for seed collection, consisting mainly of clone Tjir 1, is available on request. Seed of Prang Besar Isolated Gardens F and G and Gough Gardens I and II is available from Messrs Prang Besar Estate, Kajang, Selangor. Supply of Gough Garden seed is limited. The same holds for Chemara Isolation Garden seed 'E', to be ordered from Messrs Chemara Estate, Layang Layang, Johore.

Seeds of Kajang Estate Seed Garden should be ordered from the Manager, Kajang Estate, Kajang, Selangor and of Kuala Perak Estate Isolated Seed Garden from the Manager, Kuala Perak Estate, Telok Anson, Lower Perak.

Budwood. Budwood of the following recommended clones is available in Malaya without restriction on resale and disposal: Tjir 1, Gl 1, PR 107 and all RRIM 500 and 600 series clones. Budwood of the following clones is sold under sales agreement: RRIM 700 series clones*, and all foreign exchange clones *including* GT 1. Orders for limited amounts of budwood can be placed with the Manager, R.R.I. Experiment Station, Sungei Buloh; all budwood from the Experiment Station is sold at $5 per yard exclusive of packing and transport.

* Budwood of RRIM 701 and 707 will be available as from July 1961.

Budwood of all Prang Besar clones can only be obtained from Messrs Prang Besar Estate, Kajang, Selangor; budwood of all Chemara clones should be ordered from Chemara Estate, Layang Layang, Johore.

Planting Materials Used in Malaya 1959

IN *Planters' Bulletin 49* (July 1960) we presented an analysis of the use of different seedling families and clones in Malaya's replanting programmes over the period 1955 to 1958.

As in previous years the Department of Statistics has allowed us to compile similar figures from the returns submitted by all estates in Malaya during 1959.

CLONAL SEEDLINGS

In *Table 1* we have expressed the acreages planted with clonal seedlings as a percentage of the total planted acreage in the same year. These figures show clearly a drift away from the use of clonal seedlings, both in European-owned and Asian-owned groups of estates. (The figures differ slightly from those quoted in our article in *Planters' Bulletin 49*, because there the seedling area planted in any particular year was compared with the clonal area budded in the same year, which is usually a year later than the year of planting).

TABLE 1. ACREAGE UNDER CLONAL SEEDLINGS AS PERCENTAGE OF TOTAL ACREAGE PLANTED IN 1954 AND SUBSEQUENT YEARS

Group of estates	*1954*	*1955*	*1956*	*1957*	*1958*	*1959*	*1954/59*
European owned	39.0%	36.9%	40.0%	32.7%	26.3%	18.2%	32.2%
Asian owned	46.2%	46.9%	43.8%	40.1%	35.0%	28.7%	38.6%
Total	40.8%	39.7%	41.0%	35.0%	29.0%	22.3%	34.2%

In *Table 2* the acreages planted in 1959 with various clonal seedlings are summarised; the 1958 figures are also given for the sake of comparison. The use of Tjir 1 clonal seedlings was further reduced; it is interesting to note that in 1959 on European-owned estates the modern 'Prang Besar Gough Garden I' seedlings accounted for 45% of all clonal seedlings. (The group 'other clonal seedlings' consists mainly of Chemara E seedlings and P.B.I.G. seedlings).

CLONES

In *Table 3* the acreages budded during 1959 with the various clones are given, together with the 1958 figures and the totals over the period 1955 to 1959.

TABLE 2. ACREAGE OF CLONAL SEEDLINGS PLANTED IN 1958 AND 1959

Clonal seedlings	*European owned*		*Asian owned*		*Total*	
	1958	*1959*	*1958*	*1959*	*1958*	*1959*
Tjir 1 seedlings	5981 45.3%	2957 32.1%	6527 67.8%	4830 54.9%	12,514 54.8%	7788 43.3%
Prang Besar Gough Garden seedlings	3062 23.2%	4162 45.1%	764 7.9%	1105 12.6%	3826 16.7%	5266 29.2%
Other clonal seedlings	4172 31.5%	2100 22.8%	2345 24.3%	2861 32.5%	6517 28.5%	4961 27.5%
Total	13,221 100%	9219 100%	9636 100%	8796 100%	22,857 100%	18,015 100%

TABLE 3. ACREAGES OF CLONES ESTABLISHED ON ESTATES IN 1958, IN 1959 AND OVER A FIVE YEAR PERIOD 1955 — 1959

Clone	*1958*	*1959*	*Total 1955/1959*
Tjir 1	7793	6566	29,160
Sab 24	5	587	3308
Gl 1	924	853	3571
PB 86	11,934	6139	52,709
PR 107	4661	2761	20,131
LCB 1320	3322	2370	9490
GT 1	2898	3973	8366
RRIM 501	6947	5572	24,257
RRIM 513	2740	3292	10,224
RRIM 519	586	451	1052
RRIM 526	633	667	2109
RRIM 600	563	969	2178
RRIM 603	2765	2479	7802
RRIM 605	1795	2408	5952
RRIM 607	325	792	1333
RRIM 610	151	417	699
RRIM 612	1013	246	3902
RRIM 614	648	1040	1953
RRIM 623	2516	5508	9458
RRIM 600 Series Clones mixed, or not listed above	1237	999	4572
PB 5/51	1644	3109	6127
PB 5/63	1394	3287	5952
Prang Besar Clones mixed, or not listed above	735	885	2695
Chemara Clones	1055	1179	2899
Others and mixed	7741	3683	38,433
Total budded	66,025	60,232	258,332

We have grouped the clones together in the same way as was done in our previous article, and have presented the results for 1958 and 1959 in *Table 4*. The acreages under each group of clones are shown and these are also expressed as percentages of the total budded area for each year. There is a further analysis according to type of ownership.

TABLE 4. ACREAGES OF GROUPS OF CLONES ESTABLISHED IN 1958 AND 1959

Clone	*European-owned*		*Asian-owned*		*Total*	
	1958	*1959*	*1958*	*1959*	*1958*	*1959*
Tjir 1, Sab 24 and Gl 1	3977 9.0%	2554 6.4%	4745 21.7%	5452 27.1%	8722 13.2%	8006 13.3%
PB 86	8842 20.1%	3664 9.1%	3092 14.1%	2475 12.3%	11,934 18.1%	6139 10.2%
PR 107	1947 4.4%	1349 3.4%	2714 12.4%	1412 7.0%	4661 7.1%	2761 4.6%
LCB 1320	2247 5.1%	1321 3.3%	1075 4.9%	1049 5.2%	3322 5.0%	2370 3.9%
GT 1	2655 6.0%	3691 9.2%	243 1.1%	282 1.4%	2898 4.4%	3973 6.6%
RRIM 501	4577 10.4%	3402 8.5%	2370 10.8%	2170 10.8%	6947 10.5%	5572 9.3%
RRIM 513, 519, 526	2695 6.1%	3780 9.4%	1264 5.8%	630 3.1%	3959 6.0%	4410 7.3%
RRIM 600 series	8476 19.2%	11,085 27.7%	2537 11.6%	3773 18.7%	11,013 16.7%	14,858 24.7%
New PB and Ch clones	4207 9.5%	7438 18.6%	621 2.8%	1022 5.1%	4828 7.3%	8460 14.0%
Others and mixed	4507 10.2%	1805 4.5%	3234 14.8%	1878 9.3%	7741 11.7%	3683 6.1%
Total	44,130 100%	40,089 100%	21,895 100%	20,143 100%	66,025 100%	60,232 100%

The use of the older clones, in particular PB 86, was further reduced in the group of European-owned estates; in the group of Asian-owned estates, however, Tjir 1 is still by far the most popular clone; the acreage planted with this clone increased from 1958 to 1959.

Clones PR 107, LCB 1320 and RRIM 501 were less used in 1959, compared with the previous year; PR 107 is relatively more popular with Asian estate owners.

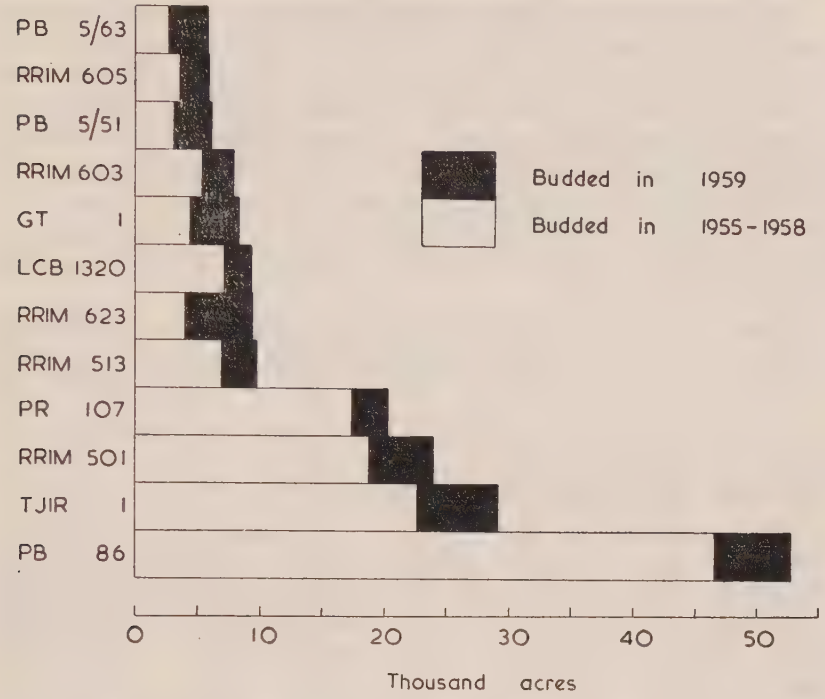

Figure 1. Use of the twelve most popular clones, 1955-59.

Clone GT 1 is becoming increasingly popular with European-owned estates.

RRIM 600 series clones were planted on a considerably larger area in 1959 than in 1958: on European-owned estates, these clones were used on 27% of the total budded area, RRIM 623 alone accounting for half of this area.

It appears that many estates are prepared to take a risk with this relatively unproven material, which is only recommended for experimental scale planting in blocks of up to 25 acres. For example, in 1959, clone RRIM 623 was used on 134 estates; on 48 of these the clone was planted on more than 50 acres.

The acreage with new Chemara and Prang Besar clones (mainly PB 5/51 and PB 5/63) in 1959 is nearly double the acreage in 1958; these clones are not very much used on Asian-owned estates.

The use of the twelve most popular clones in the period 1955 — 1959 is illustrated in *Figure 1*. Together they account for about 80% of the total area budded during this period.

CHOICE OF MATERIAL IN THE MAIN PLANTING AREAS

In comparison with clones, the use of seedlings was below average in Negri Sembilan, and above average in Perak.

If we consider budded areas alone, it appears that Tjir 1 is by far the most popular clone in Johore, while this clone was virtually not planted at all in Kedah. Clone PB 86, on the other hand, is still the most popular clone in Kedah and Negri Sembilan, and ranks quite low in Johore. This choice of material is, no doubt, related to differences in soil type: on the poorer soils of Johore, Tjir 1 performs relatively well, whereas PB 86 is slow growing and often infected by *Gloeosporium*. In 1959, Clone RRIM 501 was planted mainly in Johore and Selangor; PR 107 also ranks high in Johore, but this clone was little used in Negri Sembilan.

Of the newer clones, RRIM 623 was the favourite in Perak; planters in Johore showed less faith in GT 1 than did planters in the other States.

RRIM 600 Series Clones

THE SIXTH INTERIM REPORT is presented, covering the fifth year of tapping in the large scale trial at the Experiment Station of clones RRIM 600 to 618, and for the fourth year of tapping in the trial of clones RRIM 619 to 630. The last report appeared in *Planters' Bulletin 46*, January 1960.

We would like to emphasise that the merits of these clones should not be judged on the performance in these two Experiment Station trials alone. Additional information from estate trials, first reported in *Planters' Bulletin 48*, May 1960, should also be considered.

RRIM 600—618

The average stand during the year under review was 121 trees per acre, excluding the plots of RRIM 613, 614 and 616 which are badly affected by wind damage. The results of the fifth year of tapping, which was completed in September 1959, and which was the last year of the first panel, are shown in *Tables 1* and *2*.

Girth — Increment varied from 0.7 inches for RRIM 613 and 618 to 1.6 inches for RRIM 609. The last clone, which was one of the least vigorous clones in the immature stage (girth at four years after budding was 96% of RRIM 501) now ranks high in respect of its girth (114% of RRIM 501).

Yield — The mean yield per tree per tapping of all clones increased from 36.1 grams to 40.5 grams, but as a result of fewer tapping days the mean yield in pounds per acre during the fifth year of tapping was exactly the same as in the previous year.

There have been a few changes in the relative position of the clones. The yield of the leading clone, RRIM 600, increased sharply and

TABLE 1. LARGE SCALE TRIAL OF CLONES RRIM 600–618 AT THE R.R.I. EXPERIMENT STATION

Girth measurements (recommended clones in *italic* type)

Clone	*No. of tappable trees in Oct. '59* (1)	*Mean girth at 60 inches from the union*		*Girth increment in inches, Sept. '59–Sept. '60*	*Wind damage cases in 5th year of tapping* (2)	*Dry trees in 5th year of tapping* (2)
		In inches, Sept. '60	*As % of RRIM 501*			
RRIM 600	*204*	*27.9*	*115*	*1.3*	*1*	*3*
RRIM 601	199	27.5	114	0.9	11	5
RRIM 602	204	28.5	118	1.3	–	1
RRIM 603	193	28.0	116	1.3	5	11
RRIM 604	204	27.8	115	1.2	–	7
RRIM 605	*205*	*26.9*	*111*	*1.0*	*1*	*1*
RRIM 606	205	27.5	114	0.8	1	3
RRIM 607	*203*	*27.3*	*113*	*0.9*	*3*	*2*
RRIM 608	183	24.5	101	0.9	3	–
RRIM 609	*205*	*27.6*	*114*	*1.6*	*1*	*1*
RRIM 610	204	24.8	102	0.7	1	2
RRIM 611	205	25.9	107	0.9	–	2
RRIM 612	205	30.0	124	1.3	–	2
RRIM 613	90	24.5	102	0.7	1	9
RRIM 614	124	27.2	112	1.6	19	7
RRIM 615	202	25.3	105	1.1	–	–
RRIM 616	179	25.7	106	0.9	8	9
RRIM 617	203	25.6	106	0.8	–	5
RRIM 618	196	23.6	98	0.7	1	1
Tjir 1	201	28.1	116	1.2	4	3
RRIM 501	201	24.2	100	0.8	23	11
Mean		26.6	110	1.0		

(1) Only 55% of these trees are used for yield recording and girth measurement, boundary trees in each plot being excluded.

(2) Recorded in all trees in the experiment.

passed the 2,500 lb level. Other clones showing a marked increase in yield were Tjir 1, RRIM 602 and RRIM 606.

The yield per acre of clones 601, 613, 614, 616 and 501 decreased, mainly as a result of loss of trees through wind damage.

Wind Damage — The total number of trees lost through wind damage during the period under review was 83; the clones most affected were RRIM 501, 614, 601 and 616, in that order.

Late Dripping — The yield obtained from late dripping, expressed as percentage of total yield per clone, was relatively low for RRIM 600, and high for RRIM 613.

Dry Trees — The number of dry trees at the end of the fifth year of tapping varied from nil (RRIM 608 and 615) to eleven (RRIM 603 and 501).

TABLE 2. LARGE SCALE TRIAL OF CLONES RRIM 600–618 AT THE R.R.I. EXPERIMENT STATION

Yield (recommended clones in *italic* type)

Clone	*Parentage*	*Mean yield in fifth year of tapping*				*Mean yield over five years of tapping*				*Late dripping as % of total yield (5th year)*
		Per tree per tapping		*Per acre per annum*		*Per tree per tapping*		*Per acre per annum*		
		Grams	*As % of RRIM 501*	*lb*	*As % of RRIM 501*	*Grams*	*As % of RRIM 501*	*lb*	*As % of RRIM 501*	
RRIM 600	*Tjir 1 × PB 86*	*62.2*	*137*	*2523*	*156*	*38.9*	*112*	*1552*	*123*	*5*
RRIM 601	Tjir 1 × Gl 1	35.4	78	1357	84	27.3	78	1088	86	7
RRIM 602	Tjir 1 × Gl 1	39.3	87	1612	100	25.3	73	1045	83	6
RRIM 603	PB 86 × Pil B84	41.0	91	1525	94	31.5	91	1203	95	6
RRIM 604	Tjir 1 × PB 49	32.8	72	1306	81	26.3	76	980	78	6
RRIM 605	*Tjir 1 × PB 49*	*46.0*	*102*	*1877*	*116*	*35.8*	*103*	*1434*	*114*	*8*
RRIM 606	Tjir 1 × PB 49	44.5	98	1820	112	30.2	87	1230	97	6
RRIM 607	*Tjir 1 × PB 49*	*39.8*	*88*	*1660*	*103*	*29.0*	*83*	*1179*	*93*	*6*
RRIM 608	AVROS 33 × Tjir 1	36.3	80	1380	85	24.1	69	840	67	8
RRIM 609	*AVROS 157 × BD 5*	*39.0*	*86*	*1600*	*99*	*29.2*	*84*	*1062*	*84*	*8*
RRIM 610	RRIM 504 × Tjir 1	34.0	75	1374	85	29.6	85	1114	88	8
RRIM 611	RRIM 504 × Tjir 1	36.4	80	1484	92	26.6	76	1029	81	8
RRIM 612	AVROS 157 × PB 49	31.7	70	1301	80	20.9	60	871	69	7
RRIM 613	Tjir 1 × RRIM 509	51.4	113	775	48	43.9	126	1208	96	14
RRIM 614	Tjir 1 × RRIM 509	60.9	134	1338	83	48.8	140	1412	112	7
RRIM 615	RRIM 511 × Tjir 1	30.1	66	1222	76	20.2	58	786	62	8
RRIM 616	Tjir 1 × RRIM 507	45.5	100	1490	92	35.7	103	1231	97	10
RRIM 617	BR 2 × RRIM 500	32.0	71	1288	80	26.4	76	931	74	8
RRIM 618	Lun N × RRIM 501	26.2	58	1047	65	23.8	68	808	64	9
Tjir 1		41.5	92	1618	100	26.7	77	1024	81	6
RRIM 501	Pil A44 × Lun N	45.3	100	1618	100	34.8	100	1263	100	8
Mean		40.5	89	1486	92	30.2	86	1109	87	8

TABLE 3. LARGE SCALE TRIAL OF CLONES RRIM 619–630 AT THE R.R.I. EXPERIMENT STATION

Girth measurements (recommended clones in *italic* type)

Clone	*No. of tappable trees in July '59 (1)*	*Mean girth at 60 inches from the union*		*Girth increment in inches, June '59-June '60*	*Wind damage cases in 4th year of tapping (2)*	*Dry trees in 4th year of tapping (2)*
		In inches, June '60	*As % of RRIM 501*			
RRIM 619	158	24.9	107	1.1	13	5
RRIM 620	162	25.1	108	1.0	–	1
RRIM 621	161	25.7	110	1.3	11	6
RRIM 622	151	24.3	104	1.1	1	1
RRIM 623	*164*	*27.7*	*119*	*1.3*	–	*2*
RRIM 624	157	22.0	94	0.7	–	8
RRIM 625	163	26.8	115	0.8	–	9
RRIM 626	164	22.9	98	0.8	3	6
RRIM 627	162	25.2	108	0.9	5	5
RRIM 628	*161*	*23.0*	*99*	*0.7*	–	*10*
RRIM 629	160	23.0	99	0.8	1	1
RRIM 630	158	23.1	99	1.0	1	2
RRIM 501	162	23.3	100	0.9	18	4
Mean		24.4	105	1.0		

(1) Only 55% of these trees are used for yield recording and girth measurement, boundary trees in each plot being excluded.

(2) Recorded in all trees in the experiment.

RRIM 619—630

The average stand in this trial at the end of the year under review was 120 trees per acre. Results for the fourth year of tapping, which was completed in June 1960, are given in *Tables 3* and *4*.

Girth — Increment varied from 0.7 inches for clones RRIM 624 and 628 to 1.3 inches for RRIM 623. The mean girth of RRIM 623 is now 19% more than that of RRIM 501.

Yield — Yield in the fourth year of tapping was not very different from the previous year. Yields of clones RRIM 619 and 626 decreased; the yield of RRIM 625 improved, compared with the previous year.

Clone RRIM 628 maintained its leading position, followed by RRIM 621 and 623.

Wind Damage — The total number of trees lost through wind damage was fifty-three, against ten during the previous year. The highest figure (eighteen trees) was for RRIM 501, followed by RRIM 621 and RRIM 619.

Late Dripping — The yield obtained from late dripping is recorded once a month and has been expressed as a percentage of the total yield.

TABLE 4. LARGE SCALE TRIAL OF CLONES RRIM 619-630 AT THE R.R.I. EXPERIMENT STATION

Yield (recommended clones in *italic* type)

Clone	*Parentage*	*Mean yield in fourth year of tapping*				*Mean yield over four years of tapping*				*Late dripping as % of total yield (4th year)*
		Per tree per tapping		*Per acre per annum*		*Per tree per tapping*		*Per acre per annum*		
		Grams	*As % of RRIM 501*	*lb*	*As % of RRIM 501*	*Grams*	*As % of RRIM 501*	*lb*	*As % of RRIM 501*	
RRIM 619	RRIM 501 × Tjir 1	28.1	67	1131	65	24.6	75	973	74	12
RRIM 620	RRIM 501 × RRIM 511	38.7	92	1663	96	28.9	88	1236	94	10
RRIM 621	RRIM 504 × Tjir 1	46.6	111	1998	115	35.1	107	1611	122	25
RRIM 622	Tjir 1 × Pil B84	27.3	65	1138	66	23.9	73	905	69	12
RRIM 623	*PB 49 × Pil B84*	*43.1*	*103*	*1895*	*110*	*35.0*	*107*	*1641*	*125*	*6*
RRIM 624	Tjir 1 × RRIM 529	29.6	70	1173	68	30.6	93	930	71	14
RRIM 625	Tjir 1 × RRIM 526	37.9	90	1648	95	28.3	86	1278	97	8
RRIM 626	Tjir 1 × RRIM 500	41.2	98	1786	103	36.0	109	1328	101	12
RRIM 627	Tjir 1 × RRIM 526	34.0	81	1451	84	26.7	81	1160	88	22
RRIM 628	*Tjir 1 × RRIM 527*	*54.6*	*130*	*2381*	*138*	*45.8*	*139*	*1849*	*141*	*15*
RRIM 629	Tjir 1 × RRIM 529	27.5	65	1181	68	25.8	79	937	71	9
RRIM 630	Tjir 1 × RRIM 527	35.9	85	1510	87	28.4	86	1057	80	14
RRIM 501	Pil A44 × Lun N	42.0	100	1730	100	32.9	100	1316	100	15
Mean		37.4	89	1591	92	30.9	94	1248	95	13

Late dripping is relatively serious with RRIM 621 and 627; only a small amount of late dripping was recorded for clone RRIM 623.

Dry Trees — The number of dry trees per clone at the end of the fourth year of tapping varied from one (RRIM 620, 622, 629) to ten (RRIM 628).

Correction of Manganese Deficiency

MANGANESE DEFICIENCY has previously been reported mainly on certain soils in Johore (*Planters' Bulletin 42*). However, in a recent survey leaf sampling, symptoms of manganese deficiency have frequently been observed on both coastal alluvial and inland soils in Selangor. Leaf analysis has not only revealed the severity of individual cases of deficiency, but has also indicated many instances of incipient deficiency. Symptoms have also been observed in Kelantan, Malacca, Pahang, Perak and Province Wellesley. The problem can thus no longer be considered as a localised one.

SYMPTOMS

The typical manganese deficiency symptoms, illustrated on the cover photograph, are an overall paling of the leaf with bands of green tissue outlining the midrib and veins. On unbranched trees the symptoms are more often seen on the lower whorls. On mature trees, when the canopy has closed over, the symptoms are generally observed low down in the canopy on shaded leaves. The manganese content of shaded leaves is normally less than that of leaves exposed to full sunlight: when the deficiency is very severe the difference in manganese content of shaded and exposed leaves is small, and symptoms can be observed also on exposed leaves high in the canopy.

CORRECTION OF THE DEFICIENCY

It is important to judge the severity of the deficiency, field inspection being confirmed, if necessary, by leaf analysis. At the present state of our knowledge it is considered that when the deficiency is only slight, or is confined to relatively few trees in a field, immediate correction of the deficiency is not imperative. Care should be taken, however, to watch such areas in case the deficiency becomes more severe; a severe deficiency can have an adverse effect on tree vigour and the condition should be corrected.

Applications of manganese sulphate, to both immature and mature rubber, have been successful in ameliorating the condition of trees suffering from severe manganese deficiency; in an experiment, a significant increase in growth of ten-year-old trees was recorded in the second year after application. An improvement in the appearance of the foliage can be expected 5-6 months after application.

Whilst experience is still being gained in the use of remedial applications of manganese sulphate, it is possible to present general recommendations regarding the rates of application of manganese sulphate required to improve the manganese status of the tree.

The smaller quantity in each range is intended for the less severe cases, and it is considered to be the minimal worth-while application.

The above quantities are to be applied once to areas suffering from manganese deficiency, and are not meant for use as a routine annual application. In the severe cases it is recommended that a second dressing be given after an interval of twelve months, but inspection of the area would be required before further applications could be recommended. This conservatism in the use of manganese sulphate is due to the high cost of the fertiliser, the possibility of inducing manganese toxicity if manganese sulphate were used on a routine basis, and also because a full assessment of the effects of manganese sulphate on growth and yield is not yet available.

Manganese sulphate applications result in increases in the manganese content of the bark scrap rubber. However, the bark scrap manganese should not exceed a controllable level when the recommended rates of application are employed. The manganese content of the bark scrap should always be reduced below the specified limit of 10 p.p.m. Mn, by the normal estate practices of removing the bark, and then by soaking for a minimum of two days, using a detergent.

MANGANESE SULPHATE FERTILISER AND ITS APPLICATION

Manganese sulphate can be mixed with other fertilisers, and for convenience in application it is recommended that, whenever possible, it should be applied in a special mixture with the routine NPK Mg fertilisers. It is particularly important that the smaller quantities of manganese sulphate are mixed with another fertiliser, as this will ensure that it is evenly spread over the ground and that each tree receives the correct amount of manganese. No modifications in the method of application are required and the reader is referred to *Planters' Bulletin 23* and *39* where this subject is discussed.

TABLE 1. RATES OF APPLICATION OF MANGANESE SULPHATE

Age of tree (years)	*Quantity per tree (oz)*	
	Grade A (30–32% Mn)	*Grade B (18–24% Mn)*
1 — 3	½ — 1	¾ — 1½
3 — 5	2 — 4	3 — 6
More than 5	4 — 6	6 — 9

TABLE 2. THE COMPOSITION OF SPECIAL MANGANESE MIXTURES FOR APPLICATION TO RUBBER RECEIVING DIFFERENT RATES OF A ROUTINE FERTILISER, AND USING TWO DIFFERENT GRADES OF MANGANESE SULPHATE, EACH AT A HIGH AND LOW RATE OF APPLICATION

Age of tree (years)	*Quantities per tree (oz)*					*Example Composition of special manganese mixture (parts per 100) of mixture X and $MnSO_4$*							
	Routine fertiliser mixture	*Manganese sulphate*				*Grade A*				*Grade B*			
		Grade A		*Grade B*		*Low rate*		*High rate*		*Low rate*		*High rate*	
		Low rate	*High rate*	*Low rate*	*High rate*	*X*	*$MnSO_4$*	*X*	*$MnSO_4$*	*X*	*$MnSO_4$*	*X*	*$MnSO_4$*
1 — 3	4	½ (4½)	1 (5)	¼ (4¾)	1½ (5½)	89	11	80	20	84	16	73	27
	6	½ (6½)	1 (7)	¼ (6¾)	1½ (7½)	92	8	86	14	89	11	80	20
	8	½ (8½)	1 (9)	¼ (8¾)	1½ (9½)	94	6	89	11	91	9	84	16
	12	½ (12½)	1 (13)	¼ (12¾)	1½ (13½)	96	4	92	8	94	6	89	11
3 — 5	24	2 (26)	4 (28)	3 (27)	6 (30)	92	8	86	14	89	11	80	20
	32	2 (34)	4 (36)	3 (35)	6 (38)	94	6	89	11	91	9	84	16
More than 5	32	4 (36)	6 (38)	6 (38)	9 (41)	89	11	84	16	84	16	78	22

NOTES:

(1) The figures in parenthesis show the rates of application of the special manganese mixtures. When this amount exceeds 24 oz it is especially important that the full amount be applied.

(2) Mixture X is used in the above table as an example only, any other mixture or single fertiliser could equally well be mixed with manganese sulphate.

(3) Grade A = Manganese sulphate containing 30 — 32% Mn.

(4) Grade B = Manganese sulphate containing 18 — 24% Mn.

Fertiliser suppliers can provide special mixtures containing manganese sulphate, and when the routine fertiliser is a mixture, no extra cost for mixing is incurred. If, however, it is necessary to mix manganese sulphate with a single fertiliser, such as ammonium sulphate, a small mixing cost (currently $7/- per metric ton) will be charged.

Manganese sulphate can be obtained in several grades which contain different amounts of manganese, the active ingredient. These differences arise because of variations in purity and also because manganese sulphate can occur combined with different amounts of water in hydrated form.

The various individual grades at present available in Malaya cover a range of manganese content from 18 to 32%, and their current cost varies correspondingly from approximately $540 to $950 per metric ton. These costs are quoted to emphasise the importance of considering the unit cost of 'manganese', before selecting a particular grade.

The rates of application given in *Table 1* cover two categories of manganese sulphate, a high grade (30-32% Mn) and a low grade (18-24% Mn).

Table 2 is intended for reference when calculating the composition of the special manganese mixtures to be ordered from the supplier. The manganese sulphate can be mixed with single or 'complete' mixtures, and in *Table 2* Mixture X is used as an example only.

Boric Acid Latex Exports, 1960

Despite the expected decline in total latex concentrate exports in the second half of 1960, there was an increase during the same period in shipments of low ammonia latex concentrate preserved with boric acid. 706,375 gallons were shipped, or 1,797.4 tons expressed as dry rubber. The total for 1960 is therefore 3,356.6 tons as dry rubber, some 600 tons less than 1959 and about 3% of total latex concentrate production.

The number of Malayan producers making boric acid latex concentrate increased from six to seven during the year. We understand that sizeable quantities have also been shipped from Liberia to U.S.A.

Shipments in bulk and in drums were made and eleven countries received boric acid latex concentrate. These countries were, in the order of amounts taken: Great Britain, Western Germany, Belgium, South Africa, New Zealand, Denmark, Sweden, Japan, Holland, Norway and Argentina. Substantial increases to Great Britain, Belgium and South Africa are recorded; also small increases to Japan and Holland, while Denmark and Argentina are new customers. It is noteworthy that U.S.A. and Australia, both important buyers of Malayan latex, have again shown no interest. France has not followed up the substantial quantity which she purchased in the first half of the year

Europe, excluding Great Britain, took 55.3% of shipments, follow-

ed closely by Great Britain with 40.4%. Africa, with 3.0%, and Australasia, with 1.3%, were a long way behind.

Licences to produce boric acid latex according to patents held by the Rubber Research Institute of Malaya are issued free of charge on application.

Journal

The Journal of the Rubber Research Institute of Malaya, Volume 16, Part 4, contains four papers which are summarised below:

G.F.J. Moir and S.J. Tata. *The Proteins of Hevea brasiliensis Latex. Part 3. The Soluble Proteins of 'Bottom Fraction'*. Communication 333.

This paper records some of the results of the Chemical Division's programme of fundamental research on the non-rubber substances of latex and is one of a series of papers on the proteins of latex issuing from the Natural Rubber Producers' Research Association and this Institute.

When fresh latex is centrifuged at very high speeds it is separated into three major fractions: a cream of rubber particles, a fluid phase or 'serum' and a sediment known as 'bottom fraction' (see Communication 286). In the present work, bottom fraction from various latices was freeze dried and extracted with water and the proteins in the extract were studied by paper electrophoresis. It was found that eight different electrophoretic species of protein could be distinguished. Six of these were found in seedling latex and in all the four clonal latices examined (Gl 1, Tjir 1, RRIM 501, and Pil A44). The other two were detected sporadically.

S. G. Boatman. *Detection and Estimation of Growth Substances in Hevea Latex*. Communication 334.

In 1951, Dr Chapman of Chemara Central Research Station described a method for estimating the plant growth substance content of *Hevea* latex. In this paper he put forward a theory that the concentration of growth substance in the latex affected, in some way, the yield of the tree and proceeded to demonstrate that yield increases could be obtained by the application of synthetic growth regulators, such as 2,4-D. From this work the proprietary yield stimulant mixture 'Stimulex' was developed, but the suggestion that natural hormones may themselves control latex flow in unstimulated trees has not been critically investigated.

The present paper describes in detail improved techniques for the extraction, separation and estimation of the natural growth substances occurring in latex. At least two, and probably three, active compounds have been shown to be present in the ether-soluble fraction of the extracts. The common plant growth substance 3-indolylacetic acid (IAA), which had earlier been reported to occur in *Hevea* leaves, could not be detected in latex and preliminary experiments also failed to confirm its presence in leaf material at various stages of growth.

The demonstration of the presence in latex of compounds possessing plant growth substance activity does not in itself, however, prove that they exercise a controlling effect on latex yields. Direct evidence on this point could only be obtained by the isolation of much larger amounts of material, sufficient

to permit tests on the tree itself.

Further work using these techniques was described in the author's paper presented at the Natural Rubber Research Conference and abstracted in *Planters' Bulletin 52*, January 1961.

o

K.P. JOHN. *Loss of Viability of Three Root Parasites in Infected Root Sections Buried in Soil.* Communication 335.

Observations carried out over a period of several years on the viability of the three major root diseases of *Hevea* in sections of buried roots are recorded. The most significant result of these observations from a practical point of view is the profound effect of soil conditions on the rate of disintegration of infected roots. This shows the importance of increasing the biological activity of the soil by quickly establishing a good ground cover. One of the results of improving soil conditions in this way is that root fragments remaining after clearing old rubber for replanting need not be regarded as more than a passing hazard, even if diseased.

o

J. BOLTON. *The Response of Hevea to Fertilisers on a Sandy Latosol.* Communication 336.

The results of a simple NPK fertiliser trial, carried out on a Serdang Series sandy loam soil, are discussed in terms of the responses occurring in growth and yield over 10 years of immaturity and the first 12 years of tapping. The main response has been to phosphatic fertilisers, with a smaller response to nitrogen but little to potassium. The responses may have been influenced by the low magnesium levels in the tree.

The fertiliser applications carried out in immaturity gave a far greater return than did those applied during maturity. In total amount the fertilisers applied from planting to four years after budding were equivalent to just over $2\frac{1}{2}$ lb of ammonium sulphate, $1\frac{1}{2}$ lb of concentrated superphosphate and 1 lb of muriate of potash per tree, and this resulted in an initial yield response of about 14%. After maturity each biennial application of fertilisers at $2\frac{1}{2}$ lb of ammonium sulphate, 1 lb of rock phosphate and $\frac{1}{2}$ lb of muriate of potash (approximately the same amount as was applied over four years when the trees were immature) resulted in a mean increase in yield of only 2.5%.

Details of monthly yields throughout the year, and yields from different heights of tapping of virgin and renewed bark, for five clones, are given.

Heptachlor

Heptachlor is a chlorinated hydrocarbon insecticide related to chlordane, aldrin and dieldrin. Like them, it is an excellent soil insecticide. Our tests have shown that it is very effective against termites and cockchafer grubs.

As it is more volatile than the others named, it penetrates the soil more readily. This, combined with its persistence, makes it the preferred insecticide for the control of cockchafer grubs.

The 20 per cent emulsion concentrate obtainable locally should be diluted with 400 parts of water for termite control, or with 200 parts of water for cockchafer grub control.

Book Review

R.J. JOHNSON. **Johnson's Complete Rubber Manual.** 1959, pp. 424, Colombo, Ceylon; R.J. Johnson & Co. $20 (Malayan).

We have received enquiries about this book from several planters in Malaya. Unfortunately, a close perusal of the text leads us to the conclusion that it will not be of value to Malayan readers. There are numerous omissions of important subjects and many sections of the book have not been brought up to date.

Among the important omissions from the sections on planting are: details of planting density; nursery establishment; seedling types; treatment of seedling stumps and budded stumps; recognition of early symptoms of brown bast; the effect of tapping on tree growth; chemical control of weeds. Some of the recommendations, for example in connection with the use of cover crops and the control of root disease, are at variance with Malayan practice. There is no up-to-date and reliable list of planting materials.

R. R. I. News

Dr C.C. Webster assumed duty as Director of the Institute on 16 January 1961. A note on the appointment of Dr Webster appeared on page 128 of *Planters' Bulletin 51,* November 1960.

o

Mr C.E.T. Mann, former Director of the Institute, was awarded two honours in January. At the New Year, Mr Mann was awarded the C.B.E. On January 4, he was created Honorary Johan Mangku Negara by His Majesty the Yang di-Pertuan Agong on the occasion of His Majesty's installation. The honour was awarded for public services.

o

In November 1960, Mr W.G. Wren, Head of the Chemical Division, delivered an address entitled 'Advances in the Chemistry of Natural Rubber' at a symposium held at the University of Akron, Ohio. The occasion was the unveiling of a bust of H.N. Ridley in the International Rubber Science Hall of Fame at Akron.

While in the U.S.A. Mr Wren visited the research organisations of many producers of synthetic rubber.

During his absence on leave Mr Wren also had discussions with users of natural rubber in Great Britain, U.S.A. and Japan. He returned to Malaya in mid-December.

o

In December 1960, Mr C.A.K. Salgado, who is in charge of the technical classification scheme operated by the R.R.I.M., visited Java at the request of the Balai Penjelidikan dan Pemakaian Karet (formerly I.N.I.R.O.). The object of his visit was to ensure that the methods of testing used in Indonesia were comparable with those used in other countries producing T.C. rubber and to enquire into the reasons for the decline in output of T.C. rubber in Indonesia.

o

Mr S. Sethu, B.E.(Chem.), M.Sc. (Eng.), D.I.C., A.M.I.I.Ch.E. was promoted from Assistant Chemical Engineer (Division B) to Chemical Engineer (Division A) on 1 December.

Mr Sethu took his first degree

at Annamalai University in 1955. In September 1955, he joined the graduate staff of the R.R.I.M. and worked on chemical engineering problems. In 1957, he was awarded a British Council Scholarship and went to the Imperial College of Science and Technology, London, for post-graduate research in chemical engineering. There he studied 'Electrodialysis and Electrodecantation of Skim-Rubber Latex' for which he received the degree of M.Sc.(Eng). He returned to the Institute in 1959 to work upon the removal and recovery of ammonia from skim latex, and other chemical engineering aspects of rubber latex.

o

Ir P. Riepma joined the staff of the Soils Division at the end of January. Ir Riepma graduated at the Agricultural University of Wageningen, where he studied from 1945 to 1950. Since then he has worked as a Research Officer at the Institute of Biological and Chemical Research on Field Crops in Holland. He has made a special study of weed control in cereals and has published a number of papers and a book on the use of herbicides.

At the Institute, Ir Riepma will be particularly concerned with weed control problems and plantation management systems in young rubber.

o

Mr R.N. Muthurajah joined the staff of the Chemical Division of the Institute in January. After completing his secondary education in Ceylon, he obtained a student exchange scholarship to Canterbury College, University of New Zealand, where he obtained a B.Sc. degree in General Science in 1954. Returning to Ceylon, he was awarded a Government scholarship to the Battersea College of Advanced Technology and obtained his B.Sc. (Chem. Eng.) and Diploma of Chemical Technology. From 1958 to the end of last year he was working firstly with British Oxygen Research and Development Ltd, and subsequently as chemical engineer in the research and development department of Carbide Industries Ltd in Northern Ireland.

Mr Muthurajah will be working, initially, on problems connected with the disposal of effluents from rubber factories.

Planters' Bulletin in Other Languages

The first issue of a Chinese version of *Planters' Bulletin*, mentioned in the Editorial of January last year, has now gone to press. Material from the Planters' Bulletin in English has been specially re-written for translation. The translation has also been made into both Rumi and Jawi to produce a version in the National Language. With these three editions all planters and estate staff should be catered for except those who read only Tamil.

Articles in the first Chinese and Malay editions of *Planters' Bulletin* relate to soil inspection, manuring young replantings, and methods of applying fertiliser. There is also an article on root disease and replanting illustrated in colour. The Government Replanting Scheme is discussed in Chinese, and the subject of thinning out in Malay. The issues close with a glossary to familiarise readers with terms that will be new to them.

R.R.I.M. Planters' Conference 1961

In July 1938 the first of what was to be a series of conferences for planters was organised by the Rubber Research Institute. The second such conference, arranged for 1940, was cancelled. It is now proposed that the series be revived so that planters may have the opportunity to exchange views and experiences among themselves and with scientific workers.

It is proposed that the first post-war Planters' Conference be held in Kuala Lumpur on Friday 28 July 1961 and the subject chosen for discussion is 'Tapping and Yield Stimulation'. On the following day, Saturday the 29th, it is hoped to arrange a half-day field trip to the Rubber Research Institute Experiment Station at Sungei Buloh.

A programme of papers to be presented and discussed is being arranged and it is the intention to publish abstracts of these before the conference. It is hoped that papers and discussion will embrace all important aspects of the subject, both scientific and practical. The idea behind this conference is that planters will contribute papers for discussion as well as members of the staff of the Institute and that as many planters as possible will contribute their experiences and opinions.

As is always unfortunately the case, attendances at conferences have to be restricted because of accommodation difficulties and we should like an early indication from persons who wish to attend, especially from anyone wishing to present a paper on the chosen subject.

Further details of arrangements for the Conference will be announced in the May issue of *Planters' Bulletin*.

Courses for Senior Estate Conductors

Refresher courses for senior estate conductors are offered this year at R.R.I. Experiment Station during 17 to 21 April, 15 to 19 May, 19 to 23 June and 16 to 20 July. Twelve conductors can be taken on each course; they must be senior experienced men who are actually in employment, and all applications must be made by the managers of the estates concerned.

There are still vacancies for the May, June and July courses. Please apply early to the Director.

OUR COVER PHOTOGRAPH SHOWS TWO MANGANESE DEFICIENT LEAFLETS AND A HEALTHY LEAFLET (LEFT) FOR COMPARISON. SEE ARTICLE ON PAGE 63.

The Standard Engravers & Art Printers, 63 Campbell Road Kuala Lumpur, Selangor